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METTLER TOLEDO Service

Congratulations on choosing the quality and precision of METTLER TOLEDO. Proper use of your new equipment according to this Manual and regular calibration and maintenance by our factory-trained service team ensures dependable and accurate operation, protecting your investment. Contact us about a service agreement tailored to your needs and budget. Further information is available at www.mt.com/service.

There are several important ways to ensure you maximize the performance of your investment:

- 1 **Register your product:** We invite you to register your product at www.mt.com/productregistration so we can contact you about enhancements, updates and important notifications concerning your product.
- 2 **Contact METTLER TOLEDO for service:** The value of a measurement is proportional to its accuracy – an out of specification scale can diminish quality, reduce profits and increase liability. Timely service from METTLER TOLEDO will ensure accuracy and optimize uptime and equipment life.
 - ➔ **Installation, Configuration, Integration and Training:** Our service representatives are factory-trained weighing equipment experts. We make certain that your weighing equipment is ready for production in a cost effective and timely fashion and that personnel are trained for success.
 - ➔ **Initial Calibration Documentation:** The installation environment and application requirements are unique for every industrial scale so performance must be tested and certified. Our calibration services and certificates document accuracy to ensure production quality and provide a quality system record of performance.
 - ➔ **Periodic Calibration Maintenance:** A Calibration Service Agreement provides on-going confidence in your weighing process and documentation of compliance with requirements. We offer a variety of service plans that are scheduled to meet your needs and designed to fit your budget.

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1 Safety Instructions

- Read this manual carefully before operating or servicing the device.
- Strictly observe this manual and save it for future use.

1.1 General Safety Instructions

- Only permit qualified personnel to make checks, tests and adjustments to be carried out with power on. Failing to observe these precautions can result in bodily harm.
- Always disconnect the scale from the USB cable before installing, servicing, cleaning or performing maintenance.
- Check the cable of the AC adapter and USB cable regularly. The device must not be used when the cable is damaged.
- Treat the scale carefully. Knocks to the weighing platter or overloading it excessively will damage the scale.
- Only use recommended accessories and peripherals.
- Do not open the device. The warranty is void if this stipulation is ignored. The device may only be opened by authorized personnel.
- Do not operate the device if its housing, USB cable, AC adapter including all connections are damaged. Disconnect the damaged device from the power.
- Do not touch the surface of the keypad with sharp, pointed, rough, or hard objects. Take care of the panel, in case it is damaged, disconnect the device from the power immediately.
- The device meets IP40 protection rating requirements. Please handle this device according to its IP protection rating and properly secure the environment where the device operates.

1.2 Cautionary Notes Regarding Installation

- The device must only be used indoor. Only clean the devices as stipulated in the cleaning instructions, and disconnect the devices from the power before cleaning.
- Lay the cables where they will not be damaged by any sharp edges or pose any risk of causing someone to trip.
- Only use accessories supplied by METTLER TOLEDO. Make sure that the voltage rating printed on the AC adapter is identical to your local mains voltage.
- Do not expose the device to extreme temperatures, aggressive chemical vapors, shocks, moisture, vibrations, or strong electromagnetic fields. Chemicals must be kept away from cables, plastic covers, and other corrosion prone components.

2 Introduction

2.1 About This Manual

This manual contains information about installing, operating and maintaining the scale, as well as all requirements necessary for safe use of the system. For more information about this product, please visit www.mt.com/ind-paint-mixing-scale.

This manual applies to the following product:

- RPA345

2.2 Intended Use

Use this product for weighing only. Any other type of use and operation beyond the limits of technical specifications without written consent from METTLER TOLEDO is considered as not intended.

2.2.1 Application Areas

This product is for use in non-hazardous areas.

2.2.2 Ambient Conditions

The environment where this product is operated should meet the following requirements:

- Indoor environment.
- Temperatures and humidity:
 - 0°C to 40°C (32°F to 104°F) at 10% to 85%, relative humidity, non-condensing
 - 0°C to 35°C (32°F to 95°F) at 10% to 85%, relative humidity, non-condensing (for metrological approved models)

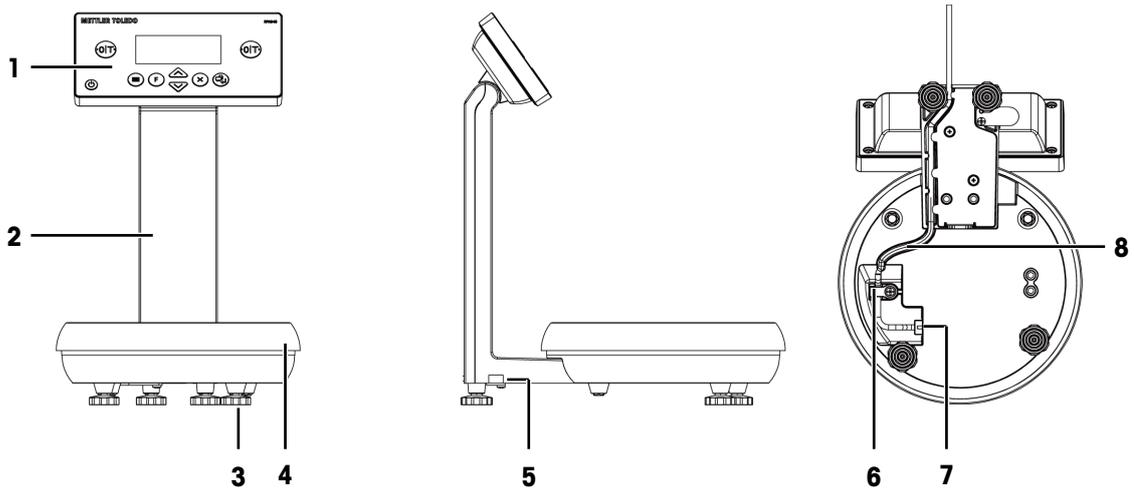
2.3 Product Overview

2.3.1 Scale

This product is designed for the automotive refinish market and offers the following features:

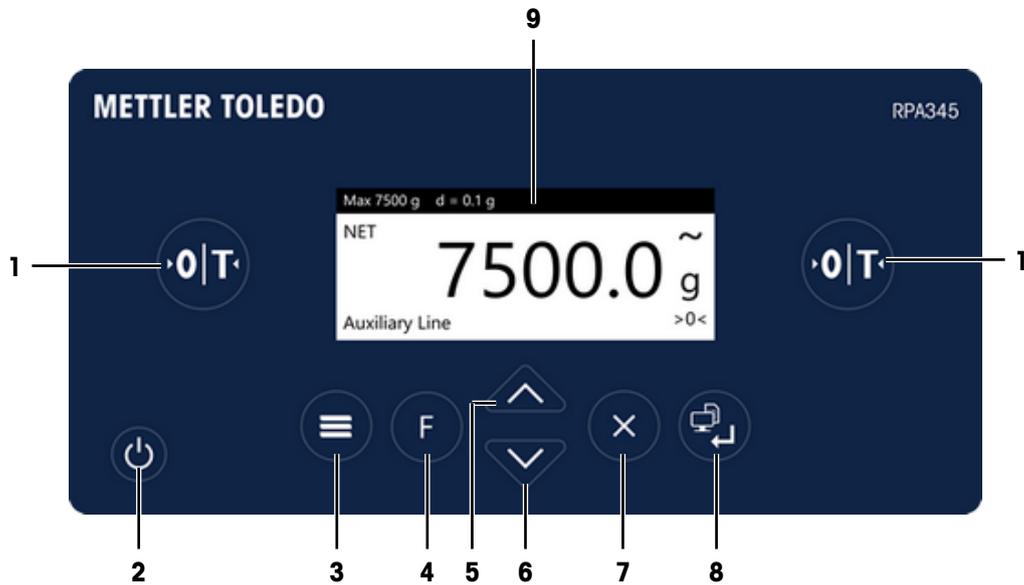
- **Higher-resolution graphic display:** Offers wider visual angle and high contrast and enhances user experience with intuitive GUI operation.
- **Keypad with two Zero/Tare buttons:** Ergonomic design allows either right-handed or left-handed scale operation.
- **RJ45 interface:** Provides both power and communication capabilities through one cable.
- **Digital load cell:** Mature digital load cell technology by METTLER TOLEDO guarantees uncompromised weighing performance and stability even after years of use.

2.3.1.1 Scale Overview



No.	Description
1	Keypad
2	Display column
3	Feet (adjustable on metrologically approved scales)
4	Weighing platter
5	Leveling bubble (only available on metrologically approved scales)
6	Cable clamp
7	RJ45 connector
8	Cable

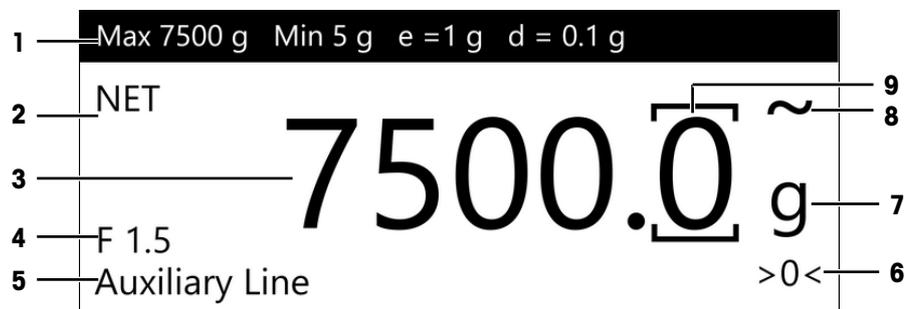
2.3.1.2 Keypad and Function Keys



No	Key	Function	Explanation
1		Zero / Tare	Press to zero or tare the scale.
2		Power	Press and hold to power on or off the scale.
3		Menu	Press to enter Menu Setting.

No	Key	Function	Explanation
4		Factor	Press to enter Factor Weighing mode. NOTICE The Factor Weighing mode is not accessible when the scale is OIML approved.
5		Up	<ul style="list-style-type: none"> Move the focus up. Previous option.
6		Down	<ul style="list-style-type: none"> Move the focus down. Next option.
7		Escape	Escape the setting or cancel the process.
8		Mode / Enter	<ul style="list-style-type: none"> In Menu Setting or Job Management mode, the button works as an "Enter" button and is used to confirm the selection. In Simple Weighing mode, the button works as a "Mode" button and is used to show the two weighing modes: Simple Weighing and Job Weighing.
9	-	Main Screen	See [Main Screen ▶ Page 9] for more information.

2.3.1.3 Main Screen



No.	Description
1	Metrological line <ul style="list-style-type: none"> Max: Maximum capacity Min: Minimum capacity e=: Approved resolution d: Display resolution
2	Net value indicator: Appears when the scale is in net mode.
3	Weight reading
4	Factor: Shows the current factor applied.
5	Auxiliary line: Shows operation instructions
6	Zero indicator
7	Unit indicator
8	Motion indicator: NOTICE Zero or tare the scale only when the motion indicator disappears, i.e. when the scale is stable.
9	Metrological-approved scale indicator: Only appears in metrologically approved scales where e does not equal to d.

3 Installation

3.1 Unpacking and Inspection

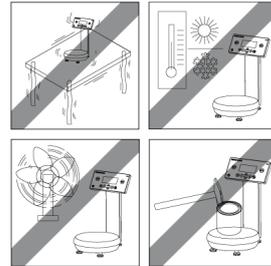
Check the contents and inspect the supply immediately upon delivery. If the shipping container is damaged upon arrival, check the contents for damage and, if necessary, submit a damage claim to the transport agency. If the container is not damaged, remove the device from the protective packaging; note how it was packaged and check all components for damage.

If the device must be shipped again, the original packaging should be reused. The device must be correctly packed to ensure safe transportation. Unplug all cables before transporting.

3.2 Selecting the Location

For accurate weighing results, care must be taken to select the optimal location for the device!

- Place the device on a stable surface which is free of vibrations and as horizontal as possible.
- Avoid excessively fluctuating temperatures and direct sunlight. Ensure correct environment conditions.
- Avoid drafts (for example, from fans or air conditioner).
- Never use a hammer to close paint cans on the weighing platter.



NOTICE

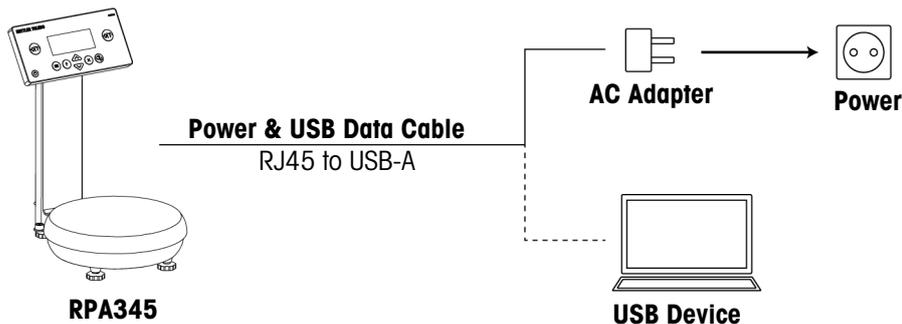
Condensation from humidity can form on the surfaces of a cold device when it is brought into a substantially warmer area.

Disconnect the device from power and allow it to acclimatize for approximately 2 hours before reconnecting it to the power.

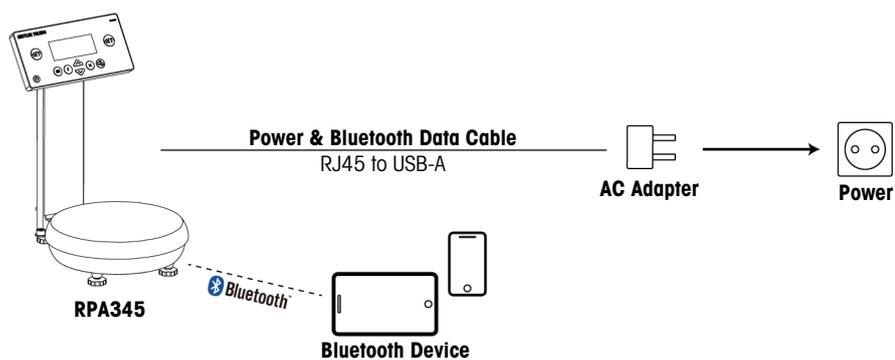
3.3 Installing RPA345

This product is designed for use in safe areas. Choose one of the following wiring solutions to install the product.

Solution 1: Wiring for power input and USB communication



Solution 2: Wiring for power input and Bluetooth communication

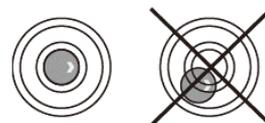


3.4 Leveling

The scale should be perfectly horizontal to ensure consistent, reproducible weighing results. Re-level the scale each time its location is changed.

Please note that all metrologically approved scales are providing a leveling bubble.

- Turn the adjustable feet until the level bubble is within the ring marking.



3.5 Warming Up



- Warm up the scale for at least 30 minutes after initial connection to the USB cable.

Doing so allows the scale to reach the required operating temperature and, consequently, deliver accurate weighing results.

4 Operation

4.1 Switching On or Off

Switching On

- Press and hold the **Power** button  until the display lights go on.
 - ➔ As soon as the weight display appears, the scale is ready for operation.

Switching Off

- Press and hold the **Power** button  until the display lights go out.

4.2 Zeroing or Taring

- 1 Place an empty container on the scale.
- 2 Press any of the two **Zero/Tare** buttons  to zero or tare the scale.
 - ➔ The zero weight value appears.



- The two Zero/Tare buttons have the identical zero and tare function and allow either right-handed or left-handed scale operation.

4.3 Locking and Unlocking the Keypad

4.3.1 Locking the Factor Button

The Factor button  can be locked so that the same factor can be used in multiple weighing sessions.

- Press the **Factor** button  and the **Zero/Tare** button  simultaneously for at least 2 seconds.
 - ➔ The message of "Factor Locked" appears briefly.

To unlock the Factor button, refer to [Unlocking the Keypad ▶ Page 12].

4.3.2 Locking the Keypad

All the buttons, except the **Zero/Tare** button , on the keypad can be locked:

- Press the **Up** button  and the **Zero/Tare** button  simultaneously for at least 2 seconds.
 - ➔ The message of "Keypad Locked" appears briefly.

NOTICE The Zero/Tare button is still functioning after the keypad is locked.

4.3.3 Unlocking the Keypad

To unlock all buttons on the keypad:

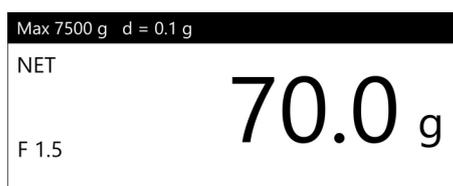
- Press the **Down** button  and the **Zero/Tare** button  simultaneously for at least 2 seconds.
 - ➔ The message of "Keypad Unlocked" appears briefly.

4.4 Applications

4.4.1 Factor Weighing

Factor Weighing allows the operator to weigh a paint mix from 0.10 to 7.00 times of a given formula.

Example



The weight value on the display is 70.0 g. The factor is 1.5. The actual weight is 105.0 g.

$$\begin{array}{r} 70.0 \text{ g} \\ \times 1.5 \\ \hline \text{Actual weight: } 105.0 \text{ g} \end{array}$$

To Set a Factor

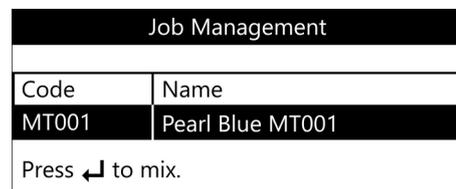
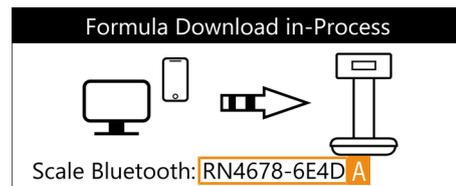
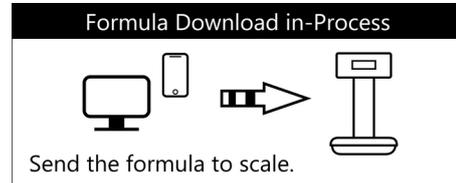
- 1 Press the **Factor** button F , the last factor will appear at the left lower corner of the display.
- 2 Press the **Factor** button F to toggle between the factor values of 0.1, 0.2, 0.25, 0.3, 0.5, 0.75, 1 (not shown), 1.5, 2, 2.5, 3, 3.5, 4 and 5.



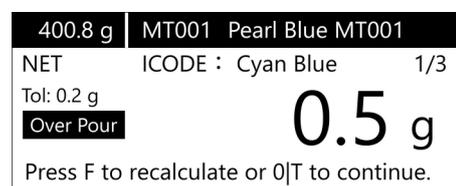
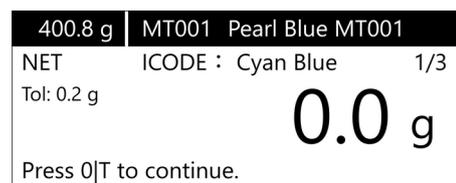
- If the factor is 1, the factor value will not show on the display.
- When the factor is set to a value other than 1, pressing and holding the **Factor** button F resets the factor to 1.

4.4.2 Job Management

- 1 Press the **Mode/Enter** button , select **Job Management**, then press the **Mode/Enter** button  again to enter Job Management mode.
- 2 If the scale is connected through USB communication (refer to [Installing RPA345 ▶ Page 10]), the operation instruction "Send the formula to scale." appears. Follow the instruction and send the formula from the USB device to the scale. When successful, continue at step 4.
- 3 If the scale is connected through Bluetooth communication (refer to [Installing RPA345 ▶ Page 10]), the display shows the **Bluetooth name (A)** of the scale. Pair the Bluetooth device with the scale, and then send the formula from the Bluetooth device to the scale. When successful, continue at step 4.
- 4 When the formula is successfully sent to the scale, the display shows the formula code and formula name. Press the **Mode/Enter** button  to start mixing.
- 5 Empty the scale. Place a container on the scale, press the **Zero/Tare** button  to tare, then press the **Mode/Enter** button .
- 6 Fill the container with the ingredient as shown in the display.
- 7 Stop filling the ingredient when the weight reading shows 0.
- 8 If the actual weight exceeds the target weight, the mixing status area shows "Over Pour" by flashing. In this case, either press the **Factor** button  to recalculate the formula or press the **Zero/Tare** button  to accept the actual weight and continue mixing.



- A - Target total weight
- B - Formula code and name
- C - Ingredient code and name
- D - Current / total ingredient
- E - Tolerance
- F - Mixing status
- G - Ingredient target weight



- 9 When the formula weighing and mixing is completed,
- ➔ If an under or over poured condition happened in the filling process, the message "Press F to recalculate or ⏪ to finish." appears. Either press the **Factor** button (F) to recalculate the formula and repeat the filling process, or press the **Mode/Enter** button (↵) and continue at step 10.
 - ➔ If no under or over poured condition happened in the filling process, continue at step 10.

Formula Mix Confirmation

There is under or over poured condition compared with the standard formula.

Press F to recalculate or ⏪ to finish.

This message appears if an under or over pour condition happened in the formula weighing and mixing process.

- 10 When the formula weighing and mixing is completed, the weighing results will be sent to the USB device or Bluetooth device automatically, at the same time, the message "Job /Formula has been completed. Have results been received?" appears on the display. Press the **Mode/Enter** button (↵) to end the process or press the **Escape** button (ⓧ) to resend the weighing results

Job Result

Job / Formula has been completed.
Have results been received?

Press ⏪ to complete or ✕ to resend.

Note

- To exit the Job Management, press the **Escape** button (ⓧ). The message "Are you sure you want to exit the job management?" appears.
 - ➔ Press the **Mode/Enter** button (↵) to confirm and exit.
 - ➔ Press the **Escape** button (ⓧ) to continue mixing.

Job Management

Are you sure you want to exit the job management?

Press ⏪ to exit or ✕ to continue mixing.

5 Setup and Configuration

Menu Setting include Scale, Calibration, Terminal, Communication and Maintenance blocks, and allow you to configure the scale, the terminal display, communication parameters, calibrate the scale, etc.

5.1 Entering Menu Setting

- 1 In the weighing screen, press the **Menu** button (☰), then the display shows the **Menu Setting** screen and the message of "Press ↵ or exit with ✕."
- 2 Press the **Mode/Enter** button (↵) to confirm entering the Menu Setting, or
- 3 Press the **Escape** button (✕) to return to the weighing screen.

5.2 Exiting Menu Setting

- 1 In the Menu Setting screen, press the **Escape** button (✕) until the message "Press ↵ to save or ✕ to exit." shows.
- 2 Press the **Mode/Enter** button (↵) to save menu setting changes and return to the weighing screen, or
- 3 Press the **Escape** button (✕) to discard menu setting changes and return to the weighing screen.

5.3 Menu Setting Structure Overview

Factory settings are printed in **bold**.

Level 1	Level 2	Level 3
Scale	Approval	OIML, Non approval
	Unit	kg, g , oz, P
	Resolution	High, Normal
	GEO	0... 12 ...30
	AZM	On, Off
	Filter	High, Middle , Low
	PowerMem	On, Off
	Reset	No , Yes
Calibration	2 kg, 3 kg, 4 kg, 5 kg , 6 kg, 7 kg	
Terminal	Languages	English , Chinese, Portuguese
	Brightness	1, 2, 3 , 4
	Reset	No , Yes
Communication	Mode	Auto SIR , SICS
	Reset	No , Yes
Maintenance	Serial Number	
	Software Version	

5.4 Menu Setting

5.4.1 Scale Menu

Factory settings are printed in **bold**.

Approval	Refers to the metrological (weights and measures) approval configuration of the scale.
OIML	Scale settings are restricted according to the local Weights and Measures regulations.
Non approval	The scale must not to be used in legal metrology.
Unit	Setting the weighing unit.
kg, g , oz, P	1P = 1/32 oz

Resolution	Setting the display resolution. The scale has the capability to have a dual range. That is for the first 999.95 g, it can go in increments of 0.05 g, then at 1000 g, the scale automatically switches to increments of 0.1g. If set as Normal, the scale will increase in increments of 0.1g from the start (0.0g) to the maximum capacity.
High	Delta range: 0...999.95 g / 0.05 g, 1000...7500 g / 0.1 g. The increment is 0.05 g for weight between 0 and 999.95 g. The increment is 0.1 g for weight between 1000 and 7500 g.
Normal	Single range: 0...7500 g / 0.1 g. The increment is 0.1 g for weight between 0 and 7500 g.
GEO	Enter Geo code for your region. The GEO code allows the scale to account for the gravitational forces depending on where the scale is used. The setting value depends on the latitude and longitude coordinates where the scale is located. See [GEO Code ▶ Page 22].
0... 12 ...30	Note: Using the Geo code value for calibration adjustment is not as accurate as re-applying certified test weights and re-calibrating the scale in a new location.
AZM	Automatic Zero Maintenance: Enables the scale to compensate for the buildup of small amounts of weight within the AZM operating range (2% of scale capacity) and tracks itself back to the center of zero.
On	Set AZM on.
Off	Set AZM off.
Filter	Select the weight reading filter according to the environment stability condition. This allows the scale to factor environmental conditions such as vibration and airflow, stabilizing the scale and avoiding weight fluctuation due to these factors.
High	Select "High" when the environment is unstable.
Middle	Select "Middle" when the environment is normal.
Low	Select "Low" when the environment is very stable.
PowerMem	Setting the weight display. When on, it allows the scale to maintain the last weight in case the power is lost on the scale. When off, the scale will recapture zero upon repower.
On	When the scale is powered on, it displays the last weight value obtained before the scale is switched off.
Off	When the scale is powered on, it does not display the last weight value obtained before the scale is switched off.
Reset	Resetting the Scale menu.
No, Yes	If Yes is selected, the entire Scale menu will be reset to factory default settings.

5.4.2 Calibration Menu

Factory settings are printed in **bold**.

Calibration	Select the calibration test weight.
2 kg, 3 kg, 4 kg, 5 kg , 6 kg, 7 kg	Calibration can be performed using different capacities. The closer it gets to the total scale capacity, the better the calibration.

To calibrate the scale:

- 1 After enter **Menu Setting**, select **Calibration**.

- 2 Select the appropriate calibration weight from 2 kg, 3 kg, 4 kg, **5 kg**, 6 kg, 7 kg. The default value is 5 kg. Press the **Mode/Enter** button to confirm.
- 3 Follow the instructions on the screen, unload the scale and then press the **Mode/Enter** button .
- 4 The scale shows the calibration weight selected in step 2.
- 5 Load the scale to the calibration weight indicated, then press the **Mode/Enter** button .
- 6 When the calibration is completed, the scale shows "-Done- Unload weight and press  to reboot".
- 7 Follow the instructions, empty the scale and then press the **Mode/Enter** button  to restart the scale.

Note

You may exit calibration during the calibration process by pressing the **Escape** button . The scale shows the message of "-Abort- Press  to exit." Press **Escape** button  to exit calibration.

5.4.3 Terminal Menu

Factory settings are printed in **bold**.

Languages	Setting the display language.
English , Chinese, Portuguese	-
Brightness	Setting the brightness of the display.
1, 2, 3 , 4	Brightness from low to high
Reset	Resetting the Terminal menu
No , Yes	If Yes is selected, the entire Terminal menu will be reset to factory default settings.

5.4.4 Communication Menu

Factory settings are printed in **bold**.

Mode	Setting the data transmission mode
Auto SIR	Automatic continuous data transmission.
SICS	Data transmission on request.
Reset	Resetting the Communication menu
No , Yes	If Yes is selected, the entire Communication menu will be reset to factory default settings.

5.4.5 Maintenance Menu

Serial Number	Shows the serial number of the unit.
(read only)	-
Software Version	Shows the software version of the unit.
(read only)	-

6 Maintenance and Service

6.1 Cleaning



WARNING

Before cleaning the device and/or the USB cable, disconnect it from power. Do not open the device and/or the USB cable. No user-serviceable parts inside.

Before cleaning the device, the USB cable and/or the AC adapter, disconnect all devices from the power supply.

- Remove dirt and foreign substances from the device, the USB cable, and the AC adapter with a soft brush or cloth.
- Take off the weighing platter and remove dirt and foreign substances which may have collected underneath it. Do not use any hard objects to do so. Do not open the weighing platform.
- If the dirt persists, use a cloth slightly soaked with a mild cleaning agent.
- Do not use cleaning agents that contain solvents or abrasive ingredients to clean the mains socket, data interface, labels and all other plastic parts.



6.2 Maintenance

Have an authorized METTLER TOLEDO service representative inspect and calibrate the device periodically. If the device is used for legal-for-trade purposes, consult the local weights and measures authorities for minimum inspection requirements. Contact your local authorized METTLER TOLEDO service representative for information about periodic inspection and calibration service.

Safety inspections of the AC adapter and its connections must be performed periodically by a qualified electrician.

6.3 Storage

If the device is not used for a long time, disconnect all connections, clean the device and store it in an environment meeting the requirements: -10°C - 60°C, at relative humidity of 5% to 95% non-condensing.

6.4 Disposal

In conformance with the European Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements.



Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment. If you have any questions, please contact the responsible authority or the distributor from which you purchased this device. Should this device be passed on to other parties, the content of this regulation must also be related.

7 Advanced Troubleshooting

Error / Symptom	Possible Cause	Remedy
Dark display	Brightness too low	<ul style="list-style-type: none"> • Set brightness higher
	No power connection to the scale	<ul style="list-style-type: none"> • Check all cables and connections
	Brief fault	<ul style="list-style-type: none"> • Switch device off and on again
Unstable weight reading	Location with vibrations	<ul style="list-style-type: none"> • Avoid vibration or change location
	Drift	<ul style="list-style-type: none"> • Avoid drift
	Contact between platter/formula container and surroundings	<ul style="list-style-type: none"> • Avoid contact between platter/formula container and surroundings
	Incorrect filter setting	<ul style="list-style-type: none"> • Change filter setting
	Low voltage	<ul style="list-style-type: none"> • Connect the scale to appropriate power supply
Incorrect weight reading	Incorrect zeroing	<ul style="list-style-type: none"> • Unload scale, set to zero and repeat weighing operation
	Incorrect tare value	<ul style="list-style-type: none"> • Clear tare
	Contact between platter and/or formula container and surroundings	<ul style="list-style-type: none"> • Avoid contact between platter and/or formula container and surroundings
	Platter not on the scale	<ul style="list-style-type: none"> • Place the platter on the scale
	Underload	<ul style="list-style-type: none"> • Set to zero by pressing the Zero/Tare button . Re-power the scale, if necessary.
	Overload	<ul style="list-style-type: none"> • Unload scale • Reduce preload
Scale is not communicating	No driver installed	<ul style="list-style-type: none"> • Download the driver at www.mt.com/ind-paint-mixing-scale, and install it

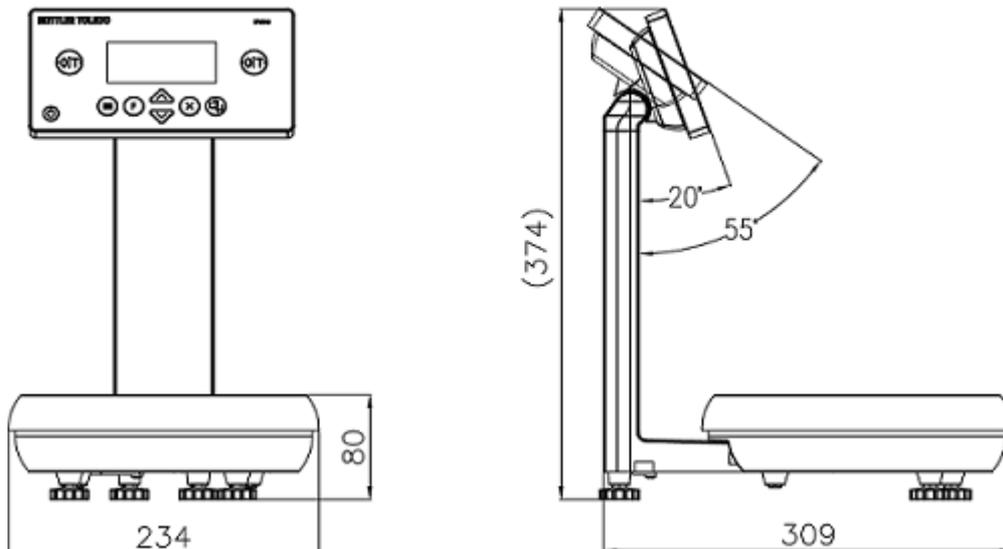
8 Appendix

8.1 Technical Data

Specifications	Non metrological-approved models	Metrological approved models
Capacity	7500 g / 999.95 g	Min. 5 g, Max. 7500 g
Verification interval e	Not applicable	1 g
Readability	0.1 g / 0.05 g	0.1 g
Weighing units	g, kg, oz, P (1 P =1/32 oz)	g
Ambient operation conditions	For indoor use only, 0°C - 40°C / 32°F - 104°F, at relative humidity of 10% to 85% non-condensing	For indoor use only, 0°C - 35°C / 32°F - 95°F, at relative humidity of 10% to 85% non-condensing
Internal application	Factor Weighing, Job Management	Job Management
Stabilization time	Less than 1 second	
Tare range	-7500 g	
Switch-on zero range	± 750 g	
Weighing platter	Φ234 mm	
Display / Keyboard	Graphic LCD display with membrane keypad	
Language	English, Chinese, Portuguese	
IP protection	IP40 in accordance with EN 60529/IEC 60529	
Interface connection	USB, Bluetooth	
Power supply	USB 2.0 or higher, or AC adapter PSAI05R-050QL6	
Input voltage Power consumption	5 VDC 5 W	
Storage and shipping	-10°C - 60°C, at relative humidity of 5% to 95% non-condensing	
Overvoltage category	II	
Pollution degree	II	
Weight (net / gross)	3.5 kg / 4.5 kg	

8.2 Dimensions

Measured in mm.



8.3 GEO Code

Geographical latitude, North or South	Height above sea level											
	[m]	0 - 325	325 - 650	650 - 975	975 - 1300	1300 - 1625	1625 - 1950	1950 - 2275	2275 - 2600	2600 - 2925	2925 - 3250	3250 - 3575
	[ft]	0 - 1060	1060 - 2130	2130 - 3200	3200 - 4260	4260 - 5330	5330 - 6400	6400 - 7460	7460 - 8530	8530 - 9600	9600 - 10660	10660 - 11730
0° 0' - 5° 46' (0.0° - 5.77°)		5	4	4	3	3	2	2	1	1	0	0
5° 46' - 9° 52' (5.77° - 12.87°)		5	5	4	4	3	3	2	2	1	1	0
9° 52' - 12° 44' (12.87° - 12.73°)		6	5	5	4	4	3	3	2	2	1	1
12° 44' - 15° 6' (12.73° - 15.1°)		6	6	5	5	4	4	3	3	2	2	1
15° 6' - 17° 10' (15.1° - 17.17°)		7	6	6	5	5	4	4	3	3	2	2
17° 10' - 19° 2' (17.17° - 19.03°)		7	7	6	6	5	5	4	4	3	3	2
19° 2' - 20° 45' (19.03° - 20.75°)		8	7	7	6	6	5	5	4	4	3	3
20° 45' - 22° 22' (20.75° - 22.37°)		8	8	7	7	6	6	5	5	4	4	3
22° 22' - 23° 54' (22.37° - 23.9°)		9	8	8	7	7	6	6	5	5	4	4
23° 54' - 25° 21' (23.9° - 25.35°)		9	9	8	8	7	7	6	6	5	5	4
25° 21' - 26° 45' (23.35° - 26.75°)		10	9	9	8	8	7	7	6	6	5	5
26° 45' - 28° 6' (26.75° - 28.1°)		10	10	9	9	8	8	7	7	6	6	5
28° 6' - 29° 25' (28.1° - 29.42°)		11	10	10	9	9	8	8	7	7	6	6
29° 25' - 30° 41' (29.42° - 30.68°)		11	11	10	10	9	9	8	8	7	7	6
30° 41' - 31° 56' (30.68° - 31.93°)		12	11	11	10	10	9	9	8	8	7	7
31° 56' - 33° 9' (31.93° - 33.15°)		12	12	11	11	10	10	9	9	8	8	7
33° 9' - 34° 21' (33.15° - 34.35°)		13	12	12	11	11	10	10	9	9	8	8
34° 21' - 35° 31' (34.35° - 35.52°)		13	13	12	12	11	11	10	10	9	9	8
35° 31' - 36° 41' (35.52° - 36.68°)		14	13	13	12	12	11	11	10	10	9	9
36° 41' - 37° 50' (36.68° - 37.83°)		14	14	13	13	12	12	11	11	10	10	9
37° 50' - 38° 58' (37.83° - 38.97°)		15	14	14	13	13	12	12	11	11	10	10
38° 58' - 40° 5' (38.97° - 40.08°)		15	15	14	14	13	13	12	12	11	11	10
40° 5' - 41° 12' (40.08° - 41.2°)		16	15	15	14	14	13	13	12	12	11	11
41° 12' - 42° 19' (41.2° - 42.32°)		16	16	15	15	14	14	13	13	12	12	11
42° 19' - 43° 26' (42.32° - 43.43°)		17	16	16	15	15	14	14	13	13	12	12
43° 26' - 44° 32' (43.43° - 44.53°)		17	17	16	16	15	15	14	14	13	13	12
44° 32' - 45° 38' (44.53° - 45.63°)		18	17	17	16	16	15	15	14	14	13	13
45° 38' - 46° 45' (45.63° - 46.75°)		18	18	17	17	16	16	15	15	14	14	13
46° 45' - 47° 51' (46.75° - 47.85°)		19	18	18	17	17	16	16	15	15	14	14

Geographical latitude, North or South	Height above sea level											
	[m]	0 - 325	325 - 650	650 - 975	975 - 1300	1300 - 1625	1625 - 1950	1950 - 2275	2275 - 2600	2600 - 2925	2925 - 3250	3250 - 3575
	[ft]	0 - 1060	1060 - 2130	2130 - 3200	3200 - 4260	4260 - 5330	5330 - 6400	6400 - 7460	7460 - 8530	8530 - 9600	9600 - 10660	10660 - 11730
47° 51' - 48° 58' (47.85° - 48.97°)		19	19	18	18	17	17	16	16	15	15	14
48° 58' - 50° 6' (48.97° - 50.1°)		20	19	19	18	18	17	17	16	16	15	15
50° 6' - 51° 13' (50.1° - 51.22°)		20	20	19	19	18	18	17	17	16	16	15
51° 13' - 52° 22' (51.22° - 52.37°)		21	20	20	19	19	18	18	17	17	16	16
52° 22' - 53° 31' (52.37° - 53.52°)		21	21	20	20	19	19	18	18	17	17	16
53° 31' - 54° 41' (53.52° - 54.68°)		22	21	21	20	20	19	19	18	18	17	17
54° 41' - 55° 52' (54.68° - 55.87°)		22	22	21	21	20	20	19	19	18	18	17
55° 52' - 57° 4' (55.87° - 57.07°)		23	22	22	21	21	20	20	19	19	18	18
57° 4' - 56° 17' (57.07° - 56.28°)		23	23	22	22	21	21	20	20	19	19	18
56° 17' - 59° 32' (56.28° - 59.53°)		24	23	23	22	22	21	21	20	20	19	19
59° 32' - 60° 49' (59.53° - 60.82°)		24	24	23	23	22	22	21	21	20	20	19
60° 49' - 62° 9' (60.82° - 62.15°)		25	24	24	23	23	22	22	21	21	20	20
62° 9' - 63° 30' (62.15° - 63.5°)		25	25	24	24	23	23	22	22	21	21	20
63° 30' - 64° 55' (63.5° - 64.92°)		26	25	25	24	24	23	23	22	22	21	21
64° 55' - 66° 24' (64.92° - 66.4°)		26	26	25	25	24	24	23	23	22	22	21
66° 24' - 67° 57' (66.4° - 67.95°)		27	26	26	25	25	24	24	23	23	22	22
67° 57' - 69° 35' (67.95° - 69.58°)		27	27	26	26	25	25	24	24	23	23	22
69° 35' - 71° 21' (69.58° - 71.35°)		28	27	27	26	26	25	25	24	24	23	23
71° 21' - 73° 16' (71.35° - 73.27°)		28	28	27	27	26	26	25	25	24	24	23
73° 16' - 75° 24' (73.27° - 75.4°)		29	28	28	27	27	26	26	25	25	24	24
75° 24' - 77° 52' (75.4° - 77.87°)		29	29	28	28	27	27	26	26	25	25	24
77° 52' - 80° 56' (77.87° - 80.93°)		30	29	29	28	28	27	27	26	26	25	25
80° 56' - 85° 45' (80.93° - 85.75°)		30	30	29	29	28	28	27	27	26	26	25
85° 45' - 90° 0' (85.75° - 90.0°)		31	30	30	29	29	28	28	27	27	26	26

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